



INTERIM GUIDE FOR PILOT
(PURPOSES ONLY)

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INTRODUCTION

The children of today live in a vast, interesting and expanding world of science. There are constantly new discoveries, new dimensions of human endeavor and challenges of facts once considered to be absolute. Our rapidly changing society produces new information faster than ever before. Such changes influence our educational practices and science education in the elementary school.

One of the general purposes of elementary school education is to develop the rational powers of the mind, that is, the intellectual abilities. Science, approached through the natural curiosity of children about themselves, and their environment, is an appropriate vehicle for accomplishing this purpose. In order to achieve this goal, however, the emphasis in science instruction must shift from the traditional teaching of facts to the development of a child's ability to use the processes of scientific investigation (eg. to observe, to measure, to classify, to infer, etc.).

DESIRABLE CHARACTERISTICS OF AN ELEMENTARY SCIENCE PROGRAM

The following statements summarize the desirable characteristics of an elementary science program. The program should:

- be activity-oriented, that is, allow for individual student activity using a variety of objects through physical manipulation.
- be student-oriented, that is, allow for maximum student participation.
- be success-oriented, that is, allow the acceptance of student responses as an inquirer, without critical response injurious to the student's self-image.
- be interesting; that is, the experiences should be educational and "fun" in the eyes of the learner.
- develop the inquiry or process skills, that is, recognize the importance of the process skills in developing logical thinking patterns and allow for systematic development of these skills through the grades.
- be relevant, that is, reflect the natural curiosity of the child about his environment in an organized, planned program or through the interest of a child piqued by a discovery on the way to school.
- be manageable for both teacher and student, that is, allow for easily implemented instructional techniques and readily grasped concepts and processes.
- be environmental in nature, that is, allow for learning as a result of exploration and understanding of the natural environment and the man-made environment.
- be diversified, that is, allow for exploration and experience in the life sciences, the physical sciences, and space and earth sciences.
- be integrated with other disciplines, that is, cooperatively develop or expand concepts or processes in common with other subject areas.
- consider the psychomotor and intellectual levels of the child in the provision of learning experiences and expected learning outcomes.

THE PHILOSOPHY OF THE ELEMENTARY SCIENCE PROGRAM

Elementary science provides the unique opportunity for children to extend their curiosity of the natural world through a series of planned learning experiences that emphasize the development of the process skills and critical thinking skills. Inherent in this philosophy is the development of skills needed to assimilate and evaluate information rather than the accumulation of information.

The elementary science program, therefore, places a strong emphasis on the development of ways of gaining and processing information through concrete learning experiences. Content, then, serves as the vehicle through which the skills are developed.

At the Division One level, the elementary science program recognizes that the child is in transition through the initial stages of intellectual development and provides opportunity for children to interact with their environment, to discover relationships and to make simple generalizations. The intent of the program at this level is to encourage and stimulate children's natural curiosity through exploration and discovery while emphasizing the communication skills to express their ideas.

At the Division Two level, the program prepares the child for more formal learning by introducing concepts at a more advanced level. The program maintains its emphasis on the development of the process skills with students actively participating in "hands-on" learning experiences. A variety of topics from the life, physical and earth-space sciences are built into the core program to provide a broad framework of experiences. The program at this level also places an emphasis on the environment and on energy resources with a view toward their responsible use.

GENERAL SCIENCE OBJECTIVES FOR GRADES 1-12

1. To develop the ability to inquire and investigate through the use of science process skills.
2. To promote assimilation of scientific knowledge.
3. To develop attitudes, interests, values, appreciations, and adjustments similar to those which are recognized as appropriate to the scientific endeavor.
4. To develop an awareness and understanding of the environment with positive attitudes and behaviors toward its use.
5. To develop an understanding of those current social problems which have a significant scientific component in terms of their cause and/or their solution.
6. To promote awareness of the humanistic implications of science.
7. To promote an understanding of the role that science has in the development of societies and the impact of society upon science.
8. To contribute to the development of vocational knowledge and skill.

THE PROCESS SKILLS

The teaching of science as inquiry is the basic instructional strategy recommended in the Alberta Elementary Science Curriculum. The strategy encourages the child to be actively involved in the learning process, and not a passive listener or reader.

A principal goal of elementary science instruction, therefore, is the development of inquiry skills, also commonly referred to as the process skills. Through these skills the child collects and processes data from the environment. The importance of these skills lies in their utility in obtaining and applying useful information toward the answering of questions or the solution to problems. They are also reflective of accepted theories of science education (viz., that children learn by direct contact with and through manipulation of observable objects, situations and events).

Children must be given appropriate opportunities and activities designed to develop the process skills. This implies that the teacher assumes the role of a director of activities rather than an imparter of knowledge. The teacher should try to provide the necessary experiences to develop the skills through activities requiring the manipulation of materials, rather than on reading or hearing about objects, situations or events.

The plan for the learning of these skills should be in a systematic manner consistent with the levels of intellectual growth of the child. This implies a sequence of skill development starting with simple observation and classification (primary grades) and proceeding to complex skills such as defining operationally or experimenting (upper elementary). As such, some of the skills should receive major emphasis at the primary level, while other skills should be delayed and developed at a later time (in terms of intellectual development of the child) in the upper elementary level.

Major Skills to be Emphasized in Division One

Observing	- obtaining information about objects or events using the five senses. Observing is the most basic skill of science. Experiences or activities should involve objects or events in the child's immediate environment, including the world outside the classroom.
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|---------------|---|
| Classifying | - organizing collections of objects or events according to common properties (color, shape, size, texture, etc.). Classification systems are used to identify objects or events to show similarities, differences, and inter-relationships. |
| Measuring | - comparing objects (size, weight, volume, temperature) with agreed upon standards or conventional metric units. Involves the use of numbers, measurement and use of spatial relationship. |
| Communicating | - describing objects, situations or events in a manner that can be interpreted by others. Communicating may involve the use of oral or written words, diagrams, maps, graphs, charts, mathematical equations or visual treatment such as photographs, film. |

At the grade three level, the skills of inferring and predicting may be introduced providing the children show proficiency in the previous skills. Inferring should be introduced with simple activities designed to differentiate between inferences and observations. Similarly, predicting should be introduced with experiences designed to show the necessity for accurate observations.

Each of the four basic skills should be introduced in grade one and maintained in each successive grade (through grade six) by use of appropriate activities. This implies that the early experiences should be simple in nature and sequentially developed toward more demanding and complex experiences.

Major Skills to be Developed in Division Two

In addition to the skills introduced in Division One, the following skills should be introduced in Division Two:

- | | |
|-----------|--|
| Inferring | - a tentative explanation or conclusion based on direct or indirect observation. The skill involves conscious reasoning about observations. The skill may be best illustrated through the following example: Given a closed box containing some unseen object, the child infers size, weight or other properties. Direct observation is not possible in this situation. |
|-----------|--|

- Predicting
- involves the making of predictions based on a sequence or number of observations or measurements.
- Controlling Variables
- the process of deciding which variables (or factors) will influence the outcome of an experiment, situation or event and deliberately controlling **all** recognized variables in a systematic manner to show their effect.
- Interpreting Data
- the method of getting the most out of data (in various forms such as graphs, histograms, tables) without over-generalizing and without loss of information inherent in the data. An inference may result from the interpretation of a particular set of data.
- Defining Operationally
- objects and events are defined in a way which can be tested or observed. Beginning with the distinction between definitions which are operational and those which are not, this developmental sequence proceeds to the point where the child constructs operational definitions in problems that are new to him. For example, an operational definition of a completed circuit would be, "When I join the copper wires, a bulb, and a dry cell in this way, the bulb will light up."
- *Formulating Hypotheses
- proposing a tentative explanation, based on a previous observation, for the occurrence of a set of events. It can be a guess to guide an investigation (working hypothesis) or accepted as highly probably in the light of established facts.
- *Experimenting
- the process of recognizing and a problem, planning and conducting a test of a hypothesis, and using the collected results to pose possible answers to the problem. Experimenting is developed through a continuation of the sequence for controlling variables, and includes the interpretation of accounts of scientific

investigation, as well as the activities of stating problems, constructing hypotheses, and carrying out experimental procedures.

** The skill of hypothesizing should be introduced at the latter part of grade six, providing the student can demonstrate proficiency in the previous skills.*

**The skill of experimenting involves a combination of several other process skills and should be introduced after sufficient treatment of the other skills has been given.*

The process or inquiry skills of science are quite different from the popular notion of a "scientific method". The latter suggests that if a particular method is followed, scientific discoveries will follow. The behavior of a scientist is less formal and is not always done in a clearly logical and systematic way. His thinking and method are both critical and creative. A scientist's behavior may be characterized as: making observations and measurements, drawing inferences, interpreting data, using intuition, making predictions, testing predictions, formulating questions, making guesses and assumptions, formulating models and hypotheses as well as experimenting.

FORMAT AND SUGGESTED USE

Core-Elective Format

The program of studies consists of a core and elective component. The specified core represents the essential skills to be developed and content to be studied. The suggested allocated time for teaching the core program should range between 60-70 percent of the total time allotted for science instruction.

The elective component represents suggested areas of instruction to occupy the remaining time available for elementary science. The teacher may cover any of the chapters designated as elective in the text programs or enrich with their own locally developed units. The intent of the elective dimension is to provide teachers with greater flexibility in their programs to meet student, teacher, or system needs.

The chart below describes the recommended time allotment for elementary science by division:

<u>Division</u>	<u>Time</u> (min./wk.) (hrs./yr.)		<u>Core</u>	<u>Elective</u>
1	90	60	36 hrs./yr. (60%)	24 hrs./yr. (40%)
11	120	80	48 hrs./yr. (60%)	32 hrs./yr. (40%)

Program Alternatives

Four alternatives have been developed by which the core program of studies may be covered. These alternatives vary in the degree to which student activities are incorporated into the program and the learning resources to be used.

Alternative 1: Primary Reference

- Science, Houghton-Mifflin Publishing Company

Alternative 2: Primary Reference

- The STEM Science Program, Addison-Wesley Publishing Company

Alternative 3: Primary Reference

- Exploring Science, Doubleday Publishing Company

Alternative 4: Multi-Reference/Resource

- Science: A Process Approach II (Grades 1-3), Ginn Publishing Company
- Elementary Science Study Units, McGraw-Hill Publishing Company
- Examining Your Environment, Holt, Rinehart & Winston Publishing Company
- Science Curriculum Improvement Study II, Gage Publishing Company
- MacDonald's 5/13 Science Series, General Learning Company
- locally/teacher developed units, E.P.S.B. units, C.B.E. units, C.S.S.B. units
- text series described in Alternatives 1, 2, 3
- This alternative is designed to utilize a number of commercially and locally developed materials to meet core program requirements.

Using the Program Alternatives

Teachers and school systems should examine each alternative carefully and choose the program alternative that best suits their instructional preferences, and available equipment and facilities. Each alternative meets the requirements of the core component but varies in terms of teaching method and the balance between reading for concept formation and the emphasis on student inquiry.

Alternative #4 allows the teacher or school system greater flexibility in the choice of materials and instructional approach. However, the use of this alternative requires organization and planning and should be attempted by teachers who have a strong science background (methods and programs) or by systems where consultative help and other support is available.

Designation of Core and Elective Components

Chapters, units or lesson clusters in each of the text series (Alternatives 1, 2, 3) have been designated as core or as elective. The designated core units should be covered in order to meet the program of studies requirements. The teacher may wish to use the remaining chapters or units as elective or fulfill the remaining elective component with locally or commercially developed material.

Since Alternative #4 is specifically offered to provide greater flexibility in the choice and use of a variety of available learning resources there is no designed core or elective materials. Teachers/systems using this alternative will need to organize and sequence the multi-resources available (or portions thereof) to meet the core requirements prescribed for each Division level.

available (or portions thereof) to meet the core requirements prescribed for each division level.

The Major Concept Areas

The elementary science program of studies has been fashioned around three major concept areas:

1. Matter and Energy
2. Living Things and Environments
3. Earth/Space/Time

For each Division, topics of study have been identified within each of the concept areas. These topic areas represent areas of study common to the four alternatives described earlier. In addition, the content of each topic area has been identified and described.

Division Specific

The program of studies defines the skills, content and attitudes to be developed and acquired at the end of each division. Hence, the curriculum is division specific and not grade specific. The scope and sequence placement of topics vary with each commercial program and make it impossible to develop grade specific curricula using a multi-alternative approach.

Specific Objectives

To assist teachers in identifying the expected student learning outcomes, the Curriculum Guide identifies core chapters in each text alternative through which the skills and concept may be covered and developed. The content of the chapter or unit is expressed by specific objectives that denote both skill and concepts to be acquired. E.g., the student should be able to:

- classify organisms as predator or prey

Skill: classifying

Concept: predator-prey relationships

PROGRAM | OVERVIEW

PROGRAM OF STUDIES OVERVIEW - ELEMENTARY SCIENCE
DIVISION ONE - CORE

PROCESS SKILLS:

Observing, Measuring, Classifying, Communicating, *Inferring, *Predicting.

*To be introduced toward the latter part of Division One.

CONCEPTS:

I. MATTER AND ENERGY

Topics: A. Properties of Objects
B. Properties of Matter
C. Air
D. Energy

II. LIVING THINGS AND ENVIRONMENT

Topics: A. Living Things
B. Plants and Animals
C. Populations

III. EARTH/SPACE/TIME

Topics: A. Position and Direction
B. Order and Time

PSYCHOMOTOR SKILLS:

- development of the motor-perceptual skills (eg. eye-hand coordination, small muscle control) through direct manipulation and effective use of apparatus
 - eg. metre stick
 - tape measures
 - magnets
 - simple balance
 - hand lens
 - thermometer
 - microscopes
 - simple hand tools

ATTITUDES:

- An awareness, appreciation, an interest in the environment, and the need to display a responsible attitude toward its conservation.
- An appreciation of the beauty, uniqueness and interdependence of all living things.
- An appreciation of science and the scientific enterprise in terms of the impact it has made on our lives.
- An interest in the value of science as a means of understanding the world.
- An awareness and concern for the responsible use of energy resources.

PROGRAM OF STUDIES OVERVIEW - ELEMENTARY SCIENCE

DIVISION TWO - CORE

PROCESS SKILLS:

Observing, Measuring, Classifying, Communicating, Inferring, Predicting, Controlling Variables, Interpreting Data, Experimenting, *Defining Operationally, *Formulating Models.

*To be introduced with lighter emphasis.

CONCEPTS:

I. MATTER AND ENERGY

Topics: A. Changes in Matter
B. Sound
C. Light
D. Electricity
E. Magnetism
F. Heat
G. Energy Resources and Conservation

II. LIVING THINGS AND THE ENVIRONMENT

Topics: A. Environmental Factors
B. Adaptations
C. Ecosystems
D. The Environment

III. EARTH/SPACE/TIME

Topics: A. Weather
B. Water and Land

PSYCHOMOTOR SKILLS:

- development of the motor-perceptual skills (eg. eye-hand coordination, small muscle control) through direct manipulation and effective use of apparatus
 - eg. metre stick
 - tape measures
 - magnets
 - simple balances
 - hand lens
 - thermometer
 - microscopes
 - simple hand tools
- ability to construct and use simple apparatus and instruments
 - eg. anemometer
 - wind direction indicators
 - clinometers
 - measuring instruments

- ability to construct special projects based on student interests
 - eg. electric quiz boards
 - simple electric motors
 - aquariums
 - terrariums
 - stream tables
 - pin hole cameras

ATTITUDES:

- An awareness, appreciation, and interest in the environment and the need to display a responsible attitude toward its preservation.
- An appreciation of the beauty, uniqueness and interdependence of all living things.
- An appreciation of science and the scientific enterprise in terms of the impact it has made on our lives.
- An interest in the value of science as a means of understanding the world.
- An awareness and concern for the responsible use of energy resources.

DIVISION 1

CORE

DIVISION ONE - CORE

I. MATTER AND ENERGY

A. PROPERTIES OF OBJECTS

Descriptive Statement

Objects can be identified, grouped, and ordered on the basis of physical properties such as colour, size, shape, texture, taste, mass, volume, smell, sound . . . Students use their senses to compare and group objects.

Content

1. Objects exhibit a number of properties.
2. Properties of objects can be determined through the use of the senses (touch, hearing, taste, smell, sight).
3. Colour, shape, size, texture, hardness and mass are properties of samples of matter.
4. Objects can be compared, ordered and classified according to one or more properties.

B. PROPERTIES OF MATTER

Descriptive Statement

Matter can be classified into 3 distinct forms (solids, liquid, gases), each with characteristic properties. Matter changes when its properties are altered. Students observe and describe matter and its changes.

Content

1. Samples of solids have distinct properties: (a) tend to retain their shape. (b) can be poured only if in small pieces. (c) have measurable mass.
2. Some solids can be classified as metals.
3. Liquids have distinct properties: (a) take the shape of the container. (b) can be poured. (c) can form drops.
4. Liquids vary in the degree of specific properties such as: (a) colour; (b) transparency to light; (c) viscosity; (d) density.
5. Gases have distinctive properties: (a) occupies space; (b) can act as a transmitter of force and cause objects to move; (c) have mass; (d) are not necessarily odorless and colorless.
6. Change occurs when the properties of objects (matter) are modified. (Eg. when water is added, or when the objects are heated or cooled.)
7. Mixtures of materials can be separated on the basis of unique properties: (a) some solid materials float in water or sink in water, (b) some solids are attracted by magnets, others are not attracted by magnets. (c) some solids dissolve readily in water; others do not.

C. AIR

Descriptive Statement

Air is a form of matter that has unique properties. Students observe and describe that air occupies space, exerts pressure and is affected by temperature.

Content

1. Air occupies space.
2. Air exerts pressure.
3. Air in the atmosphere contracts when cooled and expands when warmed.
4. Warm air rises and cold air sinks.
5. Air is all around us.

D. ENERGY

Descriptive Statement

Heat, light, sound, electricity are common forms of energy. Students infer the presence and transfer of energy by observing interactions. The sun is identified as the primary source of the earth's energy.

Content

1. There are different forms of energy. (Eg. Heat, light, sound, electricity.)
2. Temperature is a measure of heat energy and can be measured with a thermometer.
3. Solids expand or contract by heating or cooling.
4. The sun is a source of light and heat.
5. Plants and animals use energy from the sun.
6. Magnets either attract or repel other magnets.

DIVISION ONE - CORE

II. LIVING THINGS AND ENVIRONMENTS

A. LIVING THINGS

Descriptive Statement

Objects can be classified into living or non-living according to certain characteristics. Students observe, describe and compare living and non-living things.

Content

1. Things can be classified as living or non-living on the basis of the following characteristics:
 - (a) living - need food and water, grow, die reproduce.
 - (b) non-living - do not need food, do not grow, do not die, do not reproduce.
2. Living things can be classified according to properties: eg., method of locomotion, habitat, food gathering, structure, life cycle.

B. PLANTS AND ANIMALS

Descriptive Statement

Plants and animals grow, require food, water and air, and respond to their environment. Students observe, describe and measure changes in growth, and identify factors necessary for life.

Content

1. Animals are living things which: (a) grow, (b) feed on other animals and plants, (c) move, (d) reproduce.
2. Different animals (eg. families, species) have different characteristics.
3. Domestic animals require care to meet their needs.
4. Plants are living things: (a) which require water and sunlight (for most plants), (b) which grow, (c) need soil or other sources of nutrients.
5. Seeds have certain requirements for growth and are dispersed in many ways.
6. Plants and animals respond to stimuli in their environment (light, moisture, temperature, food).
7. Plants differ from animals in specific ways, relative to how they obtain food, react to stimuli, and move.
8. Plants and animals live in many different habitats within an environment.
9. Young plants resemble their parents. Some animals reproduce young which resemble their parents. Other animals do not resemble their parents until mature.

C. POPULATIONS

Descriptive Statement

Populations are groups of organisms that grow and develop in a certain environment and are in a constant state of change. Students construct habitats (terrariums or aquariums) to observe and describe interacting populations and change.

Content

1. The term "population" describes a group of organisms of the same kind in a particular environment.
2. The place of a population is its habitat.
3. Populations in a particular habitat form a community.
4. Populations are in a state of change. They are affected by:
 - (a) environmental factors (moisture, temperature, light);
 - (b) other populations, eg. predators, man.

DIVISION ONE - CORE
III. EARTH/SPACE/TIME

A. POSITION AND DIRECTION

Descriptive Statement

Position of an object is located in terms of distance and direction from a reference object. Students describe and measure the position (distance, direction) of an object.

Content

1. An object's position and size and direction can be described by the terms: up/down, forward/back, right/left, short/tall, in/out, near/far, and above/below.
2. The position of an object is determined relative to arbitrarily chosen reference points.
3. An object's position can be determined by using a simple grid.
4. Distance can be measured using standard and non-standard units.

B. ORDER AND TIME

Descriptive Statement

Events occur and change in a particular order of sequence having varying durations of time. Students describe and measure changes that take place over time in objects and in the environment.

Content

1. Some changes occur in a regular pattern and can be ordered, eg. seasons, plant and animal growth.
2. Some changes are reversible (eg. freezing, melting) and others are not (eg. rusting, rotting).
3. Some changes occur slowly and others rapidly.
4. Weather can exhibit different kinds of change.
5. Various changes occur in the environment over time (eg. effects of erosion, decomposition, weathering)

DIVISION 1

ELECTIVES

ELECTIVES - DIVISION ONE

NATURE OF THE ELECTIVE:

1. The elective portion of the program should comprise approximately 30-40% of the instructional time allotted for DIVISION ONE science. The table below indicates the core-elective allocation of time:

DIVISION 1: Core 36 hours
 Elective 24 hours

TOTAL. . . 60 hours per year
 (90 minutes per week)

2. The elective portion of the program can be covered on a regular basis throughout the school term (eg. once a week, twice a month) or be consolidated into larger blocks of time (eg. 2 week units).
3. The content of the elective may be:
 - (a) an extension of the content in any of the core topic areas.
 - (b) a content area not prescribed as a core topic area but covered by the text series being used.
 - *(c) locally developed units as determined by the teacher or school system.
 - *(d) determined by student and/or teacher interests.

SUGGESTED ELECTIVES

PROGRAM	MATTER AND ENERGY	LIVING THINGS AND THE ENVIRONMENT	SPACE/EARTH/TIME
ESS Elementary Science Study, Gage Pub. Co.	Primary Balancing Clay Boats Mystery Powders Light and Shadows	Starting From Seeds Pond Water Life of Beans and Peas Growing Seeds Eggs and Tadpoles Behavior of Mealworms	Structures Where Is The Moon? Spinning Tables
EYE Examining Your Environment, Holt, Rinehart & Winston Co.	Your Senses	Small Creatures	
5/13 Science 5/13 Macdonald Educational	Early Experiences Change (1 + 2) Metals (1 + 2) Any of these titles, along with others in this series are recommended.	Trees (1 + 2) Mini Beasts (1 + 2)	Time (1 + 2) Structures and Forces (1 + 2)

* The Flora and Fauna Kit of Alberta can be resequenced for use as elective topics.

DIVISION 2

CORE

DIVISION TWO - CORE

I. MATTER AND ENERGY

A. CHANGES IN MATTER

Descriptive Statement

Changes in matter can be classified as physical and chemical. Students observe, infer and describe these changes. Solids, liquids, and gases have unique properties. Students observe and perform tests to identify properties of solids, liquids and gases and classifies matter on the basis of these properties.

Content

1. The physical properties of an object can undergo change. This change can usually be easily reversed.
2. Chemical changes produce new materials with different properties. Some chemical changes can be reversed but most are more difficult (eg. burning, rusting).
3. When an acid and a base are mixed in correct proportions, a neutral substance (salt) is formed.
4. Materials can be classified as acids, bases, or netural by their effect upon indicators such as litmus. Some gases can be tested using BTB solution as an indicator.
5. Matter in any state can undergo chemical change.
6. Liquids differ in properties such as density, cohesiveness, surface tension.

B. SOUND

Descriptive Statement

Vibrating matter causes sound. Students observe and describe conditions necessary to produce sound and manipulate variables that cause changes in sound.

Content

1. Sound is cause by vibrations.
2. The pitch of a sound is determined by the number of times an object vibrates in a given time (frequency).
3. Sound waves become less audible as they move further from the source.
4. Noise pollution produced by people can be controlled.
5. Solids generally conduct sound better than liquids or gases such as air.
6. Some materials conduct sounds while others absorb sound.
7. Sound energy travels in waves.

C. LIGHT

Descriptive Statement

Light is a form of energy that tends to travel in straight lines and can be reflected and refracted. Through the use of optics (lenses, prisms) students observe and describe the behavior of light.

Content

1. An object may be seen when it reflects light.
2. Light tends to travel in straight lines.
3. Some objects produce their own light.
4. Light sources vary in intensity.
5. The color, shape, and composition of an object affects the degree to which it reflects or absorbs light.
6. Some shapes will concentrate light (lenses) and some will diffuse light (prisms).
7. White light is a combination of light of all the colors of the spectrum.
8. A beam of light can be reflected or refracted.
9. Objects can be classified as transparent, opaque or translucent.
10. The shape of an object can be determined by its shadows.

D. ELECTRICITY

Descriptive Statement

Electrical energy can be transformed into other energy forms. Students construct and manipulate variables in simple circuits to infer the path that electricity travels.

Content

1. When some materials are rubbed together, the materials receive an electrical charge.
2. An object that has an electrical charge can attract or repel another charged object.
3. There are two different kinds of electrical charges (a positive charge and a negative charge).
4. Electrical charges moving through a conductor form an electrical current.
5. An electrical current can be produced by chemical means.
6. Simple electrical circuits can be constructed using a bulb, wire, and a cell.
7. Circuits can be open (incomplete) or closed (complete).
8. Certain materials are better conductors of electrical energy than other (conductors, non-conductors).
9. In a simple circuit certain variables can be manipulated (number of bulbs, cells, thickness and length of wire).

E. MAGNETISM

Descriptive Statement

Magnetism is a property of some objects. Students will observe and describe properties of magnets and distinguish between materials that are attracted by magnets and those that are not.

Content

1. Some objects are attracted by a magnet and others are not.
2. Magnets have two poles.
3. Unlike poles of any two magnets attract, while like poles repel.
4. The strength of magnets (magnetism) can be increased.
5. Some materials (common iron and steel) can be magnetized.
6. When an electrical current passes through wire that is coiled around certain metals, the system will become an electro-magnet.
7. The magnetic field extends beyond the magnet itself.

F. HEAT

Descriptive Statement

Heat is a form of energy that can produce changes in the properties of matter. Students manipulate heat variables that affect matter and use thermometers to measure heat change.

Content

1. Heat energy passes through some materials easily (conductors) and not so easily in others (insulators).
2. Heat gain or loss can be measured using a thermometer.
3. Heat energy transfers from warmer objects to cooler objects.
4. The kind of matter, mass and color are all variables in heat energy transfer.
5. Conduction and convection are two ways heat energy can be transferred.
6. Contraction or expansion of matter and other changes in property are caused by gain or loss of heat energy.

G. ENERGY RESOURCES AND CONSERVATION

Descriptive Statement

The world's energy resources are in limited supply and should be conserved. Students examine renewable and non-renewable energy resources and man's consumption of energy.

Content

1. Energy resources can be classified as renewable and non-renewable.
2. Energy exists in many forms (eg. light, heat, chemical).
3. Alberta has a number of major energy resources (coal, sunshine, oil, natural gas).
4. Our life style and consumer behavior determine our use and misuse of energy sources.
5. Alternative energy resources (eg. solar, wind, biomass, thermal, nuclear) exist in addition to the fossil fuels.
6. There are advantages, disadvantages, problems, costs and risks associated with all energy resources.
7. Energy can be conserved in many ways (eg. recycling and reuse of waste products, change in consumer demands, change in lifestyle, change in technology).
8. New sources of energy will be required in the future.
9. Society must examine the "trade-offs" that are part of our energy consuming lifestyle.
10. Our use of energy can have adverse effects on the environment (extraction, production, consumption, waste energy).

DIVISION TWO - CORE
II. LIVING THINGS AND ENVIRONMENT*

A. ENVIRONMENTAL FACTORS

Descriptive Statement

Organisms live where environmental factors are best suited to their needs. Students manipulate such variables as moisture, temperature and light and describe and infer their effect on a population.

Content

1. Organisms respond to environmental factors of light, temperature and moisture.
2. Organisms live in habitats that have optimal factors suited to their survival.

B. ADAPTATIONS

Descriptive Statement

Adaptations allow plants and animals to survive in their environment. Students examine structural and behavioral adaptations.

Content

1. Camouflage is one kind of adaptation.
2. Structural and behavioral adaptations help organisms to survive in their environment.
3. Some organisms develop through stages of a life cycle with each stage exhibiting special adaptations.
4. Organisms show behavioral adaptations to environmental changes (eg. migration, hibernation).

C. ECOSYSTEMS

Descriptive Statement

Living and non-living things interact in an ecosystem. Interacting populations (communities) require matter and energy from the environment for survival. Students examine food chains, food webs and various cycles (life, energy) that are part of an ecosystem.

*Supplement with Flora and Fauna of Alberta Heritage Learning Resources Kit.

Content

1. Organisms interact within a population.
2. Populations of animals depend on other populations for food:
(a) the plant eaters (herbivores), (b) the animal eaters (carnivores).
3. Some animals interact in a predator-prey relationship.
4. Food is cycled within an environment (producer-consumer-decomposer).
5. Populations interact with each other in food chains and more complex food webs.
6. Populations interact to cause environmental changes (eg. succession, population increase, decrease).
7. Green plant populations are classified as producers.
8. Human populations are consumers.
9. Populations compete for the things they require to sustain life.
10. The living and non-living parts of an environment make up an ecosystem.
11. Populations are changed in response to changes in the ecosystem.

D. THE ENVIRONMENT

Descriptive Statement

Man's use of land, air and water can create complex problems. The student infers and describes man's influence (positive and negative) on the environment.

Content

1. Living things survive when they adapt to changes in their environment.
2. Some living things have adapted to man and some have been endangered by his actions.
3. Except for a constant interchange of energy from the sun, the earth is a closed system.
4. Man's influence on the environment has been positive and negative (eg. chemicals capable of pest control and improved soil fertility are also capable of being harmful to the environment).
5. People need to examine solutions for environmental problems and consider steps to improve the quality of the environment.
6. Man's future will be influenced by his present consumer behavior and interaction with the environment.

DIVISION TWO - CORE
III. EARTH/SPACE/TIME

A. WEATHER

Descriptive Statement

Weather consists of interacting factors such as temperature, pressure, precipitation, humidity and rain. Students observe, measure, predict and record weather conditions and changes.

Content

1. Weather consists of interacting factors such as temperature, pressure, precipitation, humidity and rain.
2. Weather factors can be measured in many ways (eg. thermometers, anemometers, barometers, rain gauges).
3. Clouds have been classified into four basic types: cirrus, cumulus, nimbus and stratus. Each type requires certain conditions for its formation.
4. Wind is caused by the movement of air masses.
5. Rain is formed when many small cloud droplets coalesce.
6. Warm air rises because it is pushed up by cooler, heavier air.

B. WATER AND LAND

Descriptive Statement

Moving water erodes and changes the land over time and water is recycled within the earth-atmosphere system. Students describe the water cycle in terms of evaporation, condensation and convection.

Content

1. Moving water erodes and changes the land over time.
2. Many geological formations (eg. oxbows, deltas) are as a result of the force of moving water.
3. Soils differ in their capacity to retain or hold water.
4. The water cycle plays an important role in maintaining the earth's surface water.
5. The water cycle is affected by weather conditions.
6. Water is a precious natural resource that should be conserved and kept unpolluted.
7. Reduced water quality in oceans, seas, rivers, lakes can be a serious problem to the environment and mankind.

DIVISION 2

ELECTIVES

NATURE OF THE ELECTIVE:

- DIVISION II: Core 48 hours
 Elective 32 hours

2. The elective portion of the program can be covered on a regular basis throughout the school term (eg. once a week, twice a month) or be consolidated into larger blocks of time (eg. 2 week units).

- ## SUGGESTED ELECTIVES

PROGRAM	MATTER AND ENERGY	LIVING THINGS AND THE ENVIRONMENT	SPACE/EARTH/TIME
ESS	Sink or Float Heating and Cooling Musical Instrument Recipe Book Gases and Air Balloons and Gases Colored Solutions Kitchen Physics Batteries, Bulbs (1+2) Optics	Budding Twigs Behavior of Mealworms Small Things Earthworms Animal Activity Tracks	Rocks and Charts Ice Cubes Daytime Astronomy
EYE		Trees Dandelion Birds	Mapping Small Places Mini Climates Astronomy Pollution
5/13	All titles of this series are recommended		
Ryerson Science In Action		Studies for Woodlands Teaching Outdoors Studying Insects Studying Birds Studying Soil	

* The Flora and Fauna Kit of Alberta can be resequenced for use as elective topics.

☐ **REFERENCING**

CORE TO TEXT ☐

HOUGHTON MIFFLIN

Observing (O) Describing (D)
 Investigating (I) Manipulating (M)
 Organizing (Or) Quantifying (Q)
 Generalizing (G) Applying (A)

GRADE ONE

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS
						Mins.	Wks.	Process & Psychomotor
1. Objects	There are structural patterns in all matter.	A. Exploring	A-1	C	Examining Objects	60	1	O,D,Or,M
			A-2	C	Collecting & Sorting	90	2	O,D,I,Or,M
			A-3	C	Finding Properties	85	1	O,D,I,Or,M
			A-4	C	Grouping by Properties	95	1	O,D,M
2. Special Projects	There is order in space and time	B. Observing	B-1	C	Using Your Senses	85	1	O,D,I,M
			B-2	C	Observing With Care	60	1	O,D,M
			B-3	E	Comparing Objects	65	1	O,D,M
		A. Shapes	A-1	C	Shapes and their Properties	70	1	O,D,M
			A-2	E	The Shapes of Objects	80	1	O,D,M
		B. Size	B-1	C	Comparing and Ordering	65	1	O,D,M
			B-2	C	Measuring	55	1	O,D,Or,M
		C. Position	C-1	C	Direction	70	1	O,D,M
			C-2	C	Distance	75	1	O,D,M
		D. Symmetry	D-1	E	Symmetry in Shapes	90	2	O,D,M
			D-2	E	Symmetry in Patterns	80	1	O,D,M
3. Changes	Changes and interaction are universal	A. Making Changes	A-1	C	Hand Changes	70	1	O,D,I,M,A
			A-2	C	Water Changes	65	1	O,D,I,M,A
			A-3	C	Heat Changes	60	1	O,D,M
			A-4	E	Changes in Position	65	1	O,D,M
		B. Familiar Changes	B-1	C	Order in Change	75	1	O,D,Or
			B-2	C	Time and Change	90	2	O,D,Or,M
		C. Changes Everywhere	C-1	C	Weather Changes	80	1	O,D,M
			C-2	E	You and Your Neighborhood	90	2	O,D,M

GRADE ONE

Observing (O) Describing (D)
 Investigating (I) Manipulating (M)
 Organizing (Or) Quantifying (Q)
 Generalizing (G) Applying (A)

SKILLS

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS
						Mins.	Wks.	Process & Psychomotor
4. Living Objects	Living objects change and interact	A. Let's Find Out	A-1	C	Familiar Objects	85	1	O,D,Or,M
			A-2	C	Mammals	70	1	O,D,Or
			A-3	C	Aquariums and Terrariums	65	1	O,D,M
		B. Properties	B-1	C	Living Objects Need Food	65	1	O,D,M,A
			B-2	C	Living Objects Have Young	70	1	O,D,M,A
			B-3	C	Growing Up	75	1	O,D,M,A,
			B-4	E	Objects Move	80	1	O,D,Or,I,M,A
			B-5	E	Responding	70	1	O,D,M,I,A
			B-6	C	People	120	2	O,D,Or,M

Core Elective
 26 weeks 14 weeks

Observing (O) Describing (D)
 Investigating (I) Manipulating (M)
 Organizing (Or) Quantifying (Q)
 Generalizing (G) Applying (A)

GRADE TWO

UNIT	BIG IDEA	PART	LESSON		CORE OR ELECTIVE	TOPIC	TIME		SKILLS
			CLUSTERS				Mins.	Wks.	
1. Properties of Matter	There are structural patterns in all matter	A. Solids	A-1	C	Finding Matter	110	1	O,D,Or,M,A	
			A-2	C	Identifying Solids	75	1	D,I,M,A,	
			A-3	C	Testing and Separat- ing	85	1	O,I,M,D	
			A-4	E	Comparing Solids	90	2	O,D,Or,I,M,A,	
		B. Liquids	B-1	C	Observing Liquids	75	1	O,D,I,M,A	
			B-2	C	Testing and Comparing	85	1	O,D,I,M,A,	
		C. Gases	C-1	C	Investigating Air	80	1	O,D,I,M,A	
			C-2	E	Comparing Gases	60	1	O,D,I,A	
2. Shapes and Surfaces	There is order in space and time	A. Shapes of Objects	A-1	C	Identifying Shapes	70	1	O,D,Or,M	
			A-2	E	Describing Shapes	60	1	O,D,M,	
			A-3	C	Inside and Outside	75	1	O,D,M	
		B. Properties of Surfaces	B-1	E	Examining Surfaces	70	1	O,D,M	
B-2	E		Surface Friction	60	1	O,D,M			
		C. Measuring Surfaces	C-1	C	Finding Surface Size	55	1	O,M	
			C-2	C	Finding Size and Place	70	1	M,Q,D,O	
			C-3	C	Finding Symmetry	55	1	O,D,M	
		3. Interacting Objects	Change and interaction are univer- sal	A. Interaction	A-1	E	Objects Change	65	1
A-2	C				Objects Interact	95	2	O,D,M	
B. Systems	B-1			C	Identifying systems	65	1	O,D,M,I	
	B-2			C	Examining Systems	70	1	O,D,I	
		C. Interaction and Time	B-3	C	Making Systems	85	1	O,D,M	
			B-4	E	Machines	65	1	O,D,M,I	
			C-1	C	Comparing Times	95	2	O,D,M,I	
			C-2	E	Timing Interactions	90	2	O,D,M,I	

Observing (O) Describing (D)
 Investigating (I) Manipulating (M)
 Organizing (Or) Quantifying (Q)
 Generalizing (G) Applying (A)

GRADE TWO

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS Process & Psychomotor
						Mins.	Wks.	
4. Many of a Kind	Living objects change and interact	A. Populations	A-1	C	Groups of Living Things	50	1	O,D
			A-2	C	Trees and Birds	110	2	O,D,I,M
			A-3	C	Starting Population	135	2	O,D,M
		B. Population Properties	B-1	E	Change in Number	65	1	O,D,M
			B-2	C	Homes for Animals	80	1	O,D,M
			B-3	C	Homes for Plants	75	1	O,D,M
			B-4	E	Homes for People	90	1	O,D,M
			B-5	E	Alike but Different	75	1	O,D,M

Core	Elective
25 weeks	15 weeks

Observing (O) Describing (D)
 Investigating (I) Manipulating (M)
 Organizing (Or) Quantifying (Q)
 Generalizing (G) Applying (A)

GRADE THREE

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	SKILLS	
						TIME Mins. Wks.	Process & Psychomotor
1. Variation	There are structural patterns in all matter	A. Variation in Objects	A-1	E	Sampling and Estimating	100	2
			A-2	C	Grouping Objects	85	1
			A-3	C	Variations in Groups	110	1
			A-4	E	Describing Variation	105	1
		B. Variation in Matter	B-1	E	The Matter in Objects	105	2
			B-2	C	Phases of Matter	95	1
		C. Variation in Interaction	C-1	E	Variation in Systems	110	2
				E	Predicting	85	1
2. Space and Motion	There is order in space and time	A. Space	A-1	E	Space Everywhere	120	2
			A-2	C	The Space Inside	100	2
		B. Position	B-1	C	A Place In Space	90	2
			B-2	C	Position Finders	140	2
			B-3	E	Position Patterns	110	2
		C. Motion	C-1	E	Investigating Motion	65	1
			C-2	E	Clues of Motion	95	1
			C-3	E	Describing Motion	75	1
3. Interaction and Energy	Change and Interaction are Universal	A. Interaction	A-1	E	Interaction and Systems	80	1
			A-2	E	Variables in Systems	90	2
			A-3	E	Energy in Systems	80	1
		B. Energy	B-1	C	Kinds of Energy	120	2
			B-2	E	Making Energy Changes	85	1
			B-3	E	Energy Chains	70	1
		C. Looking for Energy	C-1	C	Finding Energy Givers	85	1
			C-2	C	Mystery Movers	105	2
			C-3	C	Light Energy	145	2

GRADE THREE

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS Process & Psychomotor
						Mins.	Wks.	
4. Population Interactions	Living objects change and interact	A. Interaction Within A Population	A-1	C	Interactions Home Building Inter-action Young and Old Inter-act	85	1	0,D,G,A,
			A-2	E		120	2	0,D,G,A,I,M
			A-3	C		120	2	0,D,I,Or,G,A
		B. Two Populations Inter-act	B-1	C	Plant-Eating Inter-actions Animal-Eating Inter-actions After Organisms Die	*180	2	0,D,I,Or,G,A
			B-2	C		*135	2	0,D,I,Or,Q,G,
			B-3	C		*145	2	0,D,I,M,G
		C. Many Populations Inter-act	C-1	C	Food Chains Food Webs Communities	120	2	D,Or,G,A,
			C-2	C		130	2	0,D,M,Or,Q,G,
			C-3	E		120	2	0,D,G,A,Or

* includes alternatives

Core Elective

29 weeks 11 weeks

GRADE FOUR

UNIT	BIG IDEA	PART	LESSON		CORE OR ELECTIVE	TOPIC	TIME		SKILLS	
			CLUSTERS				Mins.	Wks.		Process & Psychomotor
1. Environments	Living Objects Change and interact	A. Interactions in an Environment	A-1	C	What is an Environment	130	2	O,D,G,A		
			A-2	C	Preparing for Later	170	2	M,Q,O,D,A		
			A-3	C	Observing Factors	135	2	O,D,M,Q,G		
		B. Populations Change Environments	B-1	C	Animals cause changes	110	1	O,D,I,M,G		
			B-2	C	Plants cause changes	145	2	O,D,I,M,Q,G		
			B-3	C	People cause changes	195	1	O,D,I,M,G,A		
		C. Environments Change	C-1	E	Very slow changes	90	1	D,Q,A		
			C-2	E	Sudden changes	95	1	O,D,I,M,Or		
			C-3	E	Regular changes	100	1	D,Q,G,A		
2. Exploring Matter	There are structural patterns in all matter	A. Properties of Matter	A-1	E	Kinds of matter	130	1	O,D,M,Q,G,A		
			A-2	C	Phases of matter	110	1	O,D,I,M,G,A		
			A-3	E	Arrangement of Matter	110	1	O,D,I,M,A		
		B. Earth Matter	B-1	E	Looking at Layers	90	1	O,D,Q,G,A		
			B-2	E	Looking Inside Rocks	120	1	O,D,Or,G,M,A		
		C. Matter and Light	C-1	C	Light through Matter	145	2	O,D,I,M,G,A		
			C-2	C	Looking Through Lenses	135	2	O,D,I,M,Q,A		
		3. Patterns	There is order in space and time	A. Recognizing Patterns	A-1	E	What is a Pattern	155	2	O,D,I,M,Q,A
					A-2	E	Patterns tell Stories	140	2	O,D,I,Or,G,A
A-3	E				Patterns and Predictions	140	2	O,Or,J,Q,M,D,A,G		
B. Patterns of Structure	B-1			E	Patterns of Support	125	1	O,M,G,A,D		
	B-2			E	Patterns of Balance	155	2	O,M,G,A,Or		
		C. Patterns that Repeat	C-1	C	All Sorts of Cycles	195	2	I,D,M,O,Q,A,D		
			C-2	C	The Water Cycle	170	2	O,D,G,I,A		

GRADE FOUR

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS
						Mins.	Wks.	
4. Exploring Energy		A. Sound Energy	A-1	C	What is Energy	90	1	D,Or,A
			A-2	C	Interaction and Sound	85	1	O,D,I,M,A
			A-3	C	Sound Transfer	90	1	O,D,I,M,Q,G,A
			A-4	C	Sound Variables	90	1	O,D,I,M,Or,Q,,
		B. Heat Energy	B-1	E	Heat Transfer	175	2	O,D,I,M,Q,Or,,
			B-2	E	Heat Variables	100	1	O,D,I,M,Q,G,A
		C. Electric Energy	C-1	C	Transfer of Electricity	90	1	O,D,I,M,Or,D,A,G
			C-2	C	Variables in Circuits	90	1.	O,D,I,M,Or,D,,
			C-3	E	More About Energy			
					Transfer	90	1	O,D,I,M,A

Observing (O) Describing (D)
 Investigating (I) Manipulating (M)
 Organizing (Or) Quantifying (Q)
 Generalizing (G) Applying (A)

GRADE FIVE

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS
						Mins.	Wks.	Process & Psychomotor
1. Adaptations	Living objects change and interact	A. Outside Adaptations	A-1	C	Protective Adaptations	* 210	3	O, D, Or, Q, G, A, A
			A-2	C	Getting Food	180	3	O, D, I, Or, G, A
		B. Inside Adaptations	B-1	E	Systems	* 190	3	O, D, I, M, Or, A
			B-2	E	Cells	135	2	O, D, I, Or, A
		C. Behavioral Adaptations	C-1		Animal Behavior	* 190	2	O, D, M, G, I, Q, A
			C-2	C	Plant Behavior	* 180	2	O, D, M, G, I, Or
		D. Adaptations of Life Stages	D-1		Animal Stages	* 185	2	O, D, I, M, G, A
			D-2	C	Plant Stages	170	2	O, D, I, M, Or, G, Q, A
2. Forces	There are structural patterns in all matter	A. Forces In Action	A-1	E	Identifying Forces	120	1	O, D, I, M, A, G
			A-2	E	Measuring Forces	195	3	O, D, M, Q, G
		B. Liquids and Gases	B-1	E	Forces in Liquids	200	3	O, D, I, M, Or, G, Q, A
			B-2	E	Forces in Gases	180	3	O, D, I, M, Or, G, Q, A
			B-3	E	Volume	200	3	O, D, I, M, Or, G, Q, A
		C. Simple Machines	C-1	E	Putting Forces to Work	190	3	O, D, I, M, Or, G, Q, A
			C-2	E	Work With Inclined Planes	190	3	O, D, I, M, Or, G, Q, A
			C-3	E	Lever	160	2	O, D, I, M, Or, Q, A

Observing (O) Describing (D)
Investigating (I) Manipulating (M)
Organizing (Or) Quantifying (Q)
Generalizing (G) Applying (A)

HOUGHTON MIFFLIN

GRADE FIVE

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS
						Mins.	Wks.	Process & Psychomotor
3. Motion	There is order in space and time	A. Relative Motion	A-1	E	Objects in Motion	135	2	O,D,M,Or,A
			A-2	E	Records of Motion	175	2	O,D,I,M,Or,G,A
			A-3	E	Circular and Rotary Motion	* 140	2	A (*inferring)
		B. Describing Position	B-1	C	Reference Frames	* 150	2	O,D,I,M,G,A
			B-2	C	Using Numbered Circles	125	2	O,D,M,Q
			B-3	C	Using Numbered Lines	175	2	O,D,Q,G,A
		C. Changing Direction	C-1	E	Moving Air & Flying Objects	* 210	3	O,D,Or,Q,G,M
			C-2	E	Simple Machines	175	2	O,D,I,M,G,A,Q
			C-3	E	Motion and Machines	* 170	1	O,D,I,M,G,A
4. Matter and Energy	Change and Interaction	A. Transfer of Energy	A-1	C	Conduction and Convection	* 200	2	O,D,I,M,G,A
			A-2	E	Wave Motion	195	3	O,D,I,M,G
		B. Changes in Matter	B-1	E	Changes in Motion	170	2	O,D,Or,I,M,G,A
			B-2	E	Changes in Temperature	170	2	O,D,M,I,G,A
			B-3	E	Changes in Phase	110	1	O,D,I,M,Or,A
		C. Changes in Systems	C-1	E	Systems, Matter, and Change	* 170	2	O,D,I,M,Or,G
			C-2	C	Changes in Acids and Bases	* 240	2	O,D,I,M,Or,G
			C-3	C	Chemical and Physical Changes	* 160	2	O,D,I,M,G,A

Core - 26 weeks
Elective - 14 weeks

GRADE SIX

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS
						Mins.	Wks.	Process & Psychomotor
1. Population Needs	Living objects change and interact	A. Population Growth and Food	A-1	C	Producers and Consumers	*150	1	O,D,I,A,Or,G,Q
			A-2	E	What Have We Taken	*255	3	I,A,M,Or,G,Q
			A-3	E	Population Growth Rate	155	2	D,Q,G,A,Or
		B. Population Success	B-1	E	Successful and Unsuccessful Populations	*210	2	O,D,I,M,Q,G,A
			B-2	E	The World of Reptiles	145	1	O,D,M,G,Or,A
			B-3	E	The World of Plants	120	1	O,D,I,M,A
		C. Fuels for Populations	C-1	E	Fuels	130	2	O,D,I,M,A,Or,Q,G
			C-2	E	Food is Fuel for People	105	1	D,Or,Q,G,A
			C-3	E	Putting it all Together	110	1	D,Q,A,G
2. Models	There is order in space and time	A. The Model World	A-1	E	What is a Model	*90	1	O,D,I,G,M
			A-2	E	Ideal Models	*100	1	D,M,G,A
			A-3	E	Scale Models	*130	1	O,D,M,Q,A
			A-4	E	Models of Earth and Sky	95	1	O,D,M,Q
		B. Models of Systems	B-1	E	Models of Interaction	120	2	O,D,I,M,Or,A
			B-2	E	Models of Past and Present	*130	1	O,D,Or,G,I,A
			B-3	E	Simulation Models	*125	1	O,D,I,M,Or,G
		C. Using Models	C-1	E	Predicting From Models	100	1	O,D,I,G,A
			C-2	E	Models of Human Communication	130	1	O,I,M,Or,Q
			C-3	E	Models of Earthquakes and Volcanoes	110	1	O,D,I,M,A

GRADE SIX

UNIT	BIG IDEA	PART	LESSON CLUSTERS	CORE OR ELECTIVE	TOPIC	TIME		SKILLS Process & Psychomotor
						Mins.	Wks.	
3. Models of Matter	There are structural patterns in all matter	A. More Than One Model	A-1	C	Inferring From Models	140	2	O, M, I, Or, G, A
			A-2	C	Models of Mixing Systems	* 225	2	O, D, I, M, A
			A-3	C	Models of Mixing and Unmixing	190	2	O, D, I, Or, G, A
		B. The Small Particle Model	B-1	C	What is the Small Particle Model	210	1	O, D, I, Or, G, A
			B-2	C	Heat Affects Matter	100	1	O, D, I, A
			B-3	C	Solids, Liquids & Gases	185	2	O, D, I, Q, A
			B-4	C	Surface Properties	180	1	O, I, A, Q
		C. Models Must Be Tested	C-1	C	Liquids and Gases Flow	200	2	O, I, M, G, A, Or
			C-2	C	Gases Interact with Liquids	* 185	2	O, I, G, A
			C-3	E	Scientists and Models	* 125	1	O, D, M, G, Q, A
4. Energy and Ecosystems	Change and Interaction are Universal	A. Observing Ecosystems	A-1	C	Ecosystems	* 160	2	O, D, I, Q, A
			A-2	C	Interactions in Ecosystems	130	2	O, D, G, A
			A-3	E	People Change the Face of the Earth	150	2	O, D, G, A, Or
		B. Resources and Problems	B-1	C	Conserving Resources	140	1	O, D, Or, G, A, I
			B-2	C	Everything Goes Somewhere	160	2	O, D, I, G, Or, A
			B-3	C	Our Part in the Pollution Problem	120	1	O, D, A, I, Q, G
		C. Using Energy Wisely	C-1	E	Using Electricity	120	1	O, D, I, Q, G, A
			C-2	C	Energy Sources and Problems	155	2	O, D, Or, I, Q, G, A
			C-3	C	Making Choices	90	1	D, G, A

Core - 27 weeks

- No section on magnetism,

Elective - 13

.light or weather.

GRADE 1:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
1	Animals	C	Observing* Classifying* Communicating	3-4 weeks (5 lessons)
2	Plants	C	Communicating Classifying Observing* (Inferring)	4 weeks (6 lessons)
3	Distance	C	Measuring* Observing Communicating (Inferring)*	2-3 weeks (5 lessons)
5	Order	C	Classifying* Observing Communicating (Inferring)	1½ weeks (2 lessons)
7	Calendar Times	C	Classifying (Inferring)	1 week (3 lessons)
9	Solids	C	Classifying* Observing Measuring Communicating (Inferring)	3 weeks (6 lessons)
10	Liquids	C	Observing* Communicating	1½ weeks (3 lessons)
11	Air	C	Communicating Observing*	1 week (2 lessons)

NOTE: It is recommended that teachers do the "Enrichment Activities" suggested for all core chapters, particularly if the core time allocation is under 24 weeks.

- Gr. 3, emphasize communities as interacting populations.

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GRADE 1:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
4	Space	E	Predicting Inferring Observing	1½ weeks (2 lessons)
6	Short Time-Long Time	E	Predicting Inferring	1 week (2 lessons)
8	Moving Things	E	Communicating Predicting Inferring Classifying	1½ weeks (3 lessons)
12	Soil	C	Communicating Classifying Inferring Measuring	1 week (3 lessons)
13	Where is "away"	E	Communicating Inferring	1 week (1 lesson)

Core - 20 weeks
Elective - 20 weeks

GRADE 2:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
1	Seeds	C	Identifying Classifying* Observing Communicating* Use Numbers Describe	4 weeks (6 lessons)
2	Getting Ready	C	Describe Inferring Identifying Communicating*	2 weeks (3 lessons)
3	Standard Units	C	Measuring* Communicating Demonstrating Use Numbers	1½ weeks (3 lessons)
4	What Is Time	C	Classifying Describing* Inferring* Constructing Measuring Predicting	2-3 weeks (5 lessons)
5	Measuring Time		Observing* Describing Inferring Identifying	1 week (2 lessons)
6	Making Things Move	C	Demonstrating Identifying Inferring* Classifying Observing*	3-4 weeks (5 lessons)
7	Kinds of Matter	C	Identifying Classifying Communicating*	2 weeks (2 lessons)
8	Particles	E	Observing Inferring	2 weeks (2 lessons)

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GRADE 2:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
9	Changes In Matter	C	Classifying Inferring* Observing Communicating	2 weeks (3 lessons)
10	Animals In Spring	C	Observing* Outdoor? Inferring* Naming Communicating	2 weeks (3 lessons)
11	Plants In Spring	C	Identifying Describing Inferring* Observing* Communicating Classifying	2 weeks (3 lessons)
12	Doing Your Part	E	Observing Communicating Interpreting	2 weeks (2 lessons)

Core - 23.5 weeks
Elective- 16.5 weeks

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GRADE 3:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
1	Communities of Living Things	C	Inferring Collecting Observing* Experimenting Describing Communicating*	6 weeks (6 lessons)
2	Measurement	C	Measuring* Psychomotor skills Observing Following direc- tions Describing Constructing Recording*	5-6 weeks (5 lessons)
3	Motion & Location	C	Observing Inferring* Describing* Communicating Grid (ordered pairs)	3 weeks (4 lessons)
4	Air - An Invisible Push	C	Observing Demonstrating Experimenting Describing	3 weeks (4 lessons)
5	Bones & Muscles	E	Inferring Observing Identifying Describing	3 weeks (3 lessons)
6	Shadows & Light	C	Experimenting Predicting Inferring Intro. Variables Drawing Conclusions	2 weeks (4 lessons)

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GRADE 3:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
7	Sunlight on the Earth & Moon	E	Interpreting Inferring Communicating Identifying Recording	3 weeks (5 lessons)
8	Heat & Temperature	C	Measuring Communicating Observing Experimenting Constructing Predicting Interpreting data Drawing Conclusions	6 weeks (5 lessons)
9	It All Depends	E	Classifying Communicating Experimenting Describing Inferring	3 weeks (lesson 3)

Core - 26 weeks
Elective - 14 weeks

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GRADE 4:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
1	Life Cycles	C	Identifying Describing Observing* Memorizing Communicating*	4 weeks (4 lessons)
2	Water & the Land	C	Measuring Classifying Describing Predicting Inferring Observing Comparing Communicating	3-4 weeks (6 lessons)
3	Electric Light Circuits	C	Demonstrating Inferring Experimenting Controlling Variables Predicting Communicating Observing	6 weeks (6 lessons)
4	Cells, Tissues & Your Body	E	Observing Identifying Comparing Classifying	3 weeks (6 lessons)
5	Sliding, Rolling & Friction	E	Describing Experimenting Comparing Observing Drawing Conclusions Classifying Predicting Identifying Inferring Demonstrating	6 weeks (6 lessons)

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GRADE 4:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
6	The Air Around Us	C	Comparing Predicting* Constructing Formulating Models Measuring Observing Describing Inferring* Experimenting*	6 weeks (6 lessons)
7	Stars - Night & Day	E	Predicting Interpreting data Observing Comparing	3 weeks (4 lessons)
8	Vibrations & Sounds	C	Observing Demonstrating Communicating Experimenting Constructing Inferring Interpreting	5 weeks (5 lessons)
9	Ocean & Fresh Water Environments	C	Observing Inferring Recording Describing Comparing Identifying Experimenting Formulating Model	4 weeks (5 lessons)

Core - 26 weeks
Elective - 14 weeks

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GRADE 5:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
1	Classifying Living Things	C	Classifying* Communicating Describing	4 weeks (6 lessons)
2	Rocks in Layers	E	Predicting Observing Describing Inferring Conclusions	4 weeks (5 lessons)
3	Changes In Matter (omit emphasis on atoms and molecules)	C	Observing Identifying Measuring Classifying	4 weeks (5 lessons)
4	Your Nutrition & Other Needs	E	Identifying Experimenting Describing Measuring Communicating	4 weeks (4 lessons)
5	Magnets & Their Uses	C	Classifying Predicting Describing Interpreting Demonstrating Experimenting (some)* Communicating Constructing	3 weeks (4 lessons)
6	Winds & Convection	C	Observing Experimenting Predicting Describing Communicating Constructing Measuring	4-5 weeks (6 lessons)

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GRADE 5:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
7	Paths of Light	C	Observing Constructing Experimenting* Inferring Predicting* Identify	3 WEEKS (4 lessons)
8	Forces and Motion	E	Experimenting Observing Communicating Describing Comparing Predicting	6 weeks (6 lessons)
9	Moon - Our Nearest Neighbour	E	Listing (Comm- nicating) Calculating Constructing Describing Predicting Inferring	3 weeks (5 lessons)
10	Interdependence of Living Things	C	List - Record Identifying Observing Ordering Communicating Inferring Conclusions	4 weeks 6 lessons

Core - 23 weeks

Elective - 17 weeks

GRADE 6:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
1	Changing & Preserving Our Environment	C	Predicting Ordering Communicating Experimenting Measuring Formulating models Inferring Drawing Conclusions	4-5 weeks (5 lessons)
2	Water In the Air	C	Measuring Recording Experimenting Inferring Observing Communicating Classifying	6 weeks (7 lessons)
3	Images and Refraction	C	Experimenting Conclusions Constructing Inferring Observing Communicating	4 weeks (5 lessons)
4	The Earth in Space	E	Record Observing Formulating models Inferring	3 weeks (5 lessons)
5	Electric Charges & Currents	C	Experimenting* Predicting Recording Observing Constructing* Drawing Conclusions	5 weeks (5 lessons)

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GRADE 6:

CHAPTERS	TOPIC	CORE OR ELECTIVE	PROCESS	APPROX. TIME
6	Using Forces	E	Identifying Measuring Calculating Constructing Conclusions	2 weeks (4 lessons)
7	Changes In the Land	E	Acquisition of Information Notetaking	3 weeks (5 lessons)
8	Living Things - Continuity and Change	E	Experimenting Comparing Predicting Reading	4 weeks (5 lessons)
9	Populations	C	Collect Data Interpreting Data Conclusions	2 weeks (4 lessons)
10	Energy and Energy Problems	C	Measuring Conclusions Experimenting Interpreting	4 weeks (4 lessons)

Core - 26 weeks
Elective - 14 weeks

EXPLORING SCIENCE

<u>JORE OF ELECTIVE</u>	<u>LESSON CLUSTER</u>	<u>SPECIFIC TOPIC</u>	<u>TIME/WEEKS</u>	<u>PROCESS SKILLS</u>	<u>PSYC. MOTOR</u>
Core	Unit 1	Senses (Properties of Objects)	5 weeks	Observation, Inferring, Predicting, Comparing, Communicating	
Core	Unit 2	Living things	6 weeks	Observing, Classifying, Inferring, Predicting, Comparing, Communicating, Experimenting.	
Core	Unit 3	Sorting	5 weeks	Observing, Classifying, Comparing, Communicating, Inter. data.	
Core	Unit 6	Spaces and places	6 weeks	Inferring, Predicting, Observing, Classifying, Communicating, Spatial rel., Experimenting.	Operating individual body members.
*Elective	Unit 4	Light and Shadow (Energy and Time)	4 weeks	Predicting, Observing, Inferring, Communicating, Spatial Rel., Experimenting, Comparing.	Eye-foot co-ordination Eye-hand co-ordination
Elective	Unit 5	Time	6 weeks	Inferring, Observing, Measuring, Predicting, Communicating, Comparing using members, Inter data.	Drawing and coloring (making a drawing of an idea) Reading a clock.

*Not recommended for Grade 1

Core - 24 weeks
Elective - 16 weeks

EXPLORING SCIENCE

CORE OR ELECTIVE	LESSON CLUSTER	SPECIFIC TOPIC	TIME	PROCESS SKILLS	ATTITUDES AND PSYC. MOTOR
Core	Unit 1	Food for Animals and You (Living Things & Energy) (Ecological Relationships)	6 weeks	Inferring, Observing, Classifying, Collecting data, Comparing, Interpreting data.	Eye-hand - cutting pictures Eye-hand - drawing
Core	Unit 2	Environment (Weather, Time, Air Change)	6 weeks	Observing, Collecting data, Inferring, Classifying, Comparing, Spatial relations, Communicating, Interpreting data, Experimenting	-Awareness -responsibility value -drawing a circle -hand-eye coordination
Core	Unit 3	Measuring (Measurement, standard units)	7 weeks	Inferring, Predicting, Comparing, Observing, Using numbers, Collecting data, Measuring, Communicating, Classifying	-Value -Measuring-one after the other, ordering
Core	Unit 4	Magnets Properties, kinds, uses	5 weeks	Classifying, Observing, Predicting, Comparing, Interpreting data, Inferring, Experimenting.	Hand-eye coordination
Elective	Unit 5	The Moon (time, shapes of the moon)	4 weeks	Observing, Inferring, Spatial relationships, Classifying, Predicting, Collecting data, Comparing, Interpreting data, Communicating	Drawing Number in order
Elective	Unit 6	Rocks and Soils (Change, time)	5 weeks	Comparing, Observing, Classifying, Experimenting, Predicting, Inferring	Value

Core - 24 weeks
Elective - 16 weeks

EXPLORING SCIENCE

CORE OR ELECTIVE	LESSON CLUSTER	SPECIFIC TOPIC	TIME	PROCESS SKILLS	ATTITUDES AND PSYC. MOTOR
Core	Unit 1	Seed Plants (Environment, needs of plants, parts of seeds and plants and their roles adaptation)	8 weeks	Observing, Comparing, Inferring, Communicating, Experimenting.	Beauty, Importance of seed plants (value) Fine motor skills, (cutting, drawing)
Core	Unit 2	Animal Behavior (Environment and behavior interdependent in an environment)	7 weeks	Observing, Inferring, Collecting data, Predicting, Comparing, Communicating, Hypothesizing, Classifying Interpreting data, Experimenting	
Core	Unit 3	Heat and Temperature (Energy, measuring temperature, Behavior at gases, change of state, insulation, conduction)	7 weeks	Observing, Comparing, Inferring, Communicating, Measuring, Predicting.	
Elective	Unit 4	Sounds Around You (How sounds are alike and travel, hearing sounds, Animal sounds & hearing, Sources of sound)	6 weeks	Observing, Communicating, Inferring, Hypothesizing, Collecting data, Comparing, Predicting.	
Elective	Unit 5	Water in Your Environment. Importance of water Uses of water, Sources of water, Water cycle, Water purification	5 weeks	Observing, Comparing, Inferring, Hypothesizing	Value
Core	Unit 6	Location, Motion and Force NOTE: Section on "Location" is core.	2 weeks	Communicating, Classifying, Spatial relations, Interpreting data, Observing, Experimenting, Measuring, Predicting	Value

Core - 24 weeks
Elective - 16 weeks

CORE OR ELECTIVE	LESSON CLUSTER	SPECIFIC TOPIC	TIME	PROCESS SKILLS	ATTITUDES AND PSYC. MOTOR
Core	Unit 1	Plant Growth & Behavior Cell structure, plant needs, (tropism), interdependence	7 weeks	Observing, Comparing, Communicating, Classifying, Experimenting, Inferring, Predicting.	
Core	Unit 2	Animals & Their Environment Habitat & adaptation, Population, Conservation	8 weeks	Observing, Communicating, Comparing, using numbers, Inferring.	Value
Elective	Unit 3	Work & Machines Force & energy, gravity energy conservation	6 weeks	Observing, Comparing, Measuring, Inferring, Interpreting data, Experimenting	Value
Core	Unit 4	Solids, Liquids & Gases Molecules, molecular motion, change of state, chemical change Note: de-emphasize sections on atoms and molecules	5 weeks	Measuring, Observing, Comparing, Hypothesizing, Communicating, Inferring, Collecting data, Predicting, Classifying	
Core	Unit 5	Air & Weather Air pressure (force) Mass, Water cycle, humidity, weather prediction	6 weeks	Observing, Inferring, Comparing, Predicting, Measuring, Collecting data	Value
Elective	Unit 6	Watching the Sky (Solar System) energy, telling time.	5 weeks	Observing, Comparing, Inferring, using spatial relations, using numbers, Communicating, Predicting	Value

Core - 26 weeks
Elective - 14 weeks

GRADE 5

EXPLORING SCIENCE

CORE OR ELECTIVE	LESSON CLUSTER	SPECIFIC TOPIC	TIME	PROCESS SKILLS	ATTITUDES AND PSYC. MOTOR
Elective	Unit 1	Small Living Things Food chain *(Potential harmful bacteria) e.g. pl3 Habitats	7 weeks	Observing, Comparing, Communicating, Inferring	Safety, Value
Elective	Unit 2	Your Body Cells, Tissues, organs, physiological processes, Health, nutrition	6 weeks	Observing, Communicating, using numbers, Measuring, Collecting data, Comparing, Inferring	Health
Core	Unit 3	Electricity Static, current, energy, chemical energy, circuits energy conversion, magnetism, electrical communication	6 weeks	Observing, Inferring, Communicating, Predicting, Comparing, Collecting data, Interpreting data	Safety, Value
Core	Unit 4	Light Propagation, refraction reflection, color, vision	5 weeks	Observing, Comparing, Inferring, Communicating, Measuring, Collecting data, Interpreting data.	
Core	Unit 5	The changing Land-causes of land change, erosion, reduction, chemical & mechanical change, minerals, fossils, soil, interaction of living & non-living things, fossil energy, conservation recycle.	7 weeks	Observing, Communicating, Predicting, Comparing, Experimenting, Inferring, Classifying	Value
Core	Unit 6	Mapping the Earth * Migration, Properties of magnet, weather, kinds of maps, symbols, scales	6 weeks	Observing, Communications, Interpreting data, spatial relations, Inferring, Measuring, using numbers, Comparing, Predicting	Interdisciplinary

Note: decrease emphasis on "Mapping the Earth".

Core - 24 weeks
Elective - 16 weeks

CORE OR ELECTIVE	LESSON CLUSTER	SPECIFIC TOPIC	TIME	PROCESS SKILLS	ATTITUDES AND PSYC. MOTOR
Elective	Unit 1	Interacting with Your Environment Human senses & narrow systems adapting, habits reflexive behavior, learned behavior.	5 weeks	Observing, Collecting data, Comparing, Value Inferring, Communicating	Value
Core	Unit 2	Plant & Animal Life Cycles Reproduction, cell behavior, growth, metamorphosis.	7 weeks	Observing, Communicating, Inferring, Comparing,	Safety, Cutting with a knife
Core	Unit 3	Matter and You Properties of matter, Inertia, gravity, molecules & atoms, elements, compounds, mixtures. Note: decrease emphasis on molecules, inertia & gravity.	3 weeks	Observing, Inferring, Measuring, Predicting, Communicating, Comparing, Hypothesizing, Classifying.	
Core	Unit 4	Changes in Energy Kinds of energy	6 weeks	Measuring, Observing, Inferring, Experimenting, Communicating, Predicting, Hypothesizing, Comparing	
Elective	Unit 5	Earth in Space Solar system, comets, asteroids, meteors, meteorities, telescopes sun	4 weeks	Measuring, Comparing, Communicating, Inferring, Predicting, Observing, Experimenting	
Core	Unit 6	Ecosystem Earth Interaction-Living, non-living, social systems, cycles (H ₂ O, O ₂ , H) solar energy, interdependency (living, non-living), food webs	6 weeks	Predicting, Experimenting, Observing, Inferring, Communicating, Comparing, Hypothesizing	Value

Core - 22 weeks
Elective - 18 weeks

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